

What is claimed is:

1. A broadband switch arrangement comprising:
  - 5 (a) a plurality of MEMS switches arranged on a substrate about an axis through said substrate, each MEMS switch being disposed on a common imaginary circle centered on said axis, and each MEMS switch being spaced equidistantly along the circumference of said imaginary circle, the circle having a diameter which is smaller than one half wavelength for all frequencies in a passband of said broadband switch;
  - 10 (b) a conductive via in said substrate arranged parallel to and on said axis; and
  - (c) connections for connecting a RF port of each one of said plurality of MEMS switches with said conductive via.
2. The broadband switch arrangement of claim 1 wherein the substrate has a ground plane  
15 therein, said conductive via passing through said ground plane without contacting said ground plane.
3. The broadband switch arrangement of claim 2 further including a plurality of strip lines, each one of said plurality of strip lines being coupled to a RF contact of one of said plurality of  
20 MEMS switches.
4. The broadband switch arrangement of claim 3 wherein said plurality of strip lines are radially arranged relative to said axis.
- 25 5. The broadband switch arrangement of claim 4 wherein said plurality of strip lines and said plurality of MEMS switches are disposed on a first major surface of said substrate.
6. The broadband switch arrangement of claim 5 further including a plurality of control

lines disposed on said first major surface of said substrate, each control line being coupled to an associated one of said plurality of MEMS switches and being disposed between two adjacent strip lines.

5     7.     The broadband switch arrangement of claim 6 wherein each of the plurality of control lines has a first width and wherein each of the plurality of strip lines has a second width, the second width being at least three times greater than the first width.

8.     The broadband switch arrangement of claim 6 further including a plurality of  
10     conductive vias in said substrate arranged parallel to said axis and contacting said ground plane, each of said plurality of MEMS switches having a DC ground contact which is wired to one of the plurality of conductive vias contacting said ground plane.

9.     The broadband switch arrangement of claim 8 further including an impedance device  
15     coupling the conductive via on the central point to one of the plurality of conductive vias, the impedance device being disposed adjacent a second major surface of said substrate.

10.    The broadband switch arrangement of claim 5 further including a plurality of control lines arranged in pairs and disposed on said first major surface of said substrate, each control  
20     line pair being coupled to an associated one of said plurality of MEMS switches and being disposed between two adjacent strip lines.

11.    The broadband switch arrangement of claim 10 wherein each of the plurality of control lines has a first width and wherein each of the plurality of strip lines has a second width, the  
25     second width being at least three times greater than the first width.

12.    A switch arrangement comprising a plurality of switch units, each switch unit having at least two MEMS switches coupled to a central point, the at least two MEMS switches of the

switch unit being arranged to couple selectively at least two transmission line ports to said central point, and at least a third MEMS switch coupled to said central point and adapted to be connected to a central point associated with an adjacent one of said plurality of switch units.

5 13. The switch arrangement of claim 12 wherein each switch unit has a centrally disposed transmission line, the centrally disposed transmission line connecting the switch unit to the at least a third MEMS switch associated with an adjacent one of said plurality of switch units.

10 14. The switch arrangement of claim 13 wherein the centrally disposed transmission line is linearly arranged from the central point of each switch unit towards the at least a third MEMS switch associated with an adjacent one of said plurality of switch units.

15. A switch arrangement comprising:

15 (a) a plurality of MEMS switches arranged on a substrate about a central point, each MEMS switch being disposed on a common imaginary circle centered on said central point, said common imaginary circle having a diameter which is less than one half wavelength of frequencies in a passband of the switch arrangement; and

(b) connections for connecting a RF port of each one of said MEMS switches with said central point.

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16. The switch arrangement of claim 15 wherein at least two of the MEMS switches are spaced equidistantly along the circumference of said imaginary circle and arranged to couple selectively at least two transmission lines to said central point and wherein a pair of the at least two transmission lines are disposed co-linearly of each other.

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17. The switch arrangement of claim 16 wherein at least one of the MEMS switches is arranged to couple selectively the central point of the switch arrangement to a central point associated with another switch arrangement via a transmission line segment.

18. The switch arrangement of claim 16 wherein the substrate has a ground plane therein and the switch arrangement further includes a conductive via in said substrate arranged parallel to and on a vertical axis which is normal to a major surface of substrate and which passes  
5 through said central point, the conductive via passing through said ground plane without contacting same.

19. The switch arrangement of claim 18 further including a plurality of strip lines, each one of said plurality of strip lines being coupled to a RF contact of one of said plurality of MEMS  
10 switches.

20. The switch arrangement of claim 19 wherein said plurality of strip lines are radially arranged relative to said central point.

15 21. The switch arrangement of claim 20 wherein said plurality of strip lines and said plurality of MEMS switches are disposed on a first major surface of said substrate.

22. The switch arrangement of claim 21 further including a plurality of control lines disposed on said first major surface of said substrate, each control line being coupled to an  
20 associated one of said plurality of MEMS switches and being disposed between two adjacent strip lines of said plurality of strip lines.

23. The switch arrangement of claim 22 further including a plurality of conductive vias in said substrate arranged parallel to said axis and contacting said ground plane, each of said  
25 plurality of MEMS switches having a DC ground contact which is wired to a one of a plurality of conductive vias contacting said ground plane.

24. The switch arrangement of claim 23 further including an impedance device coupling a

conductive via on the central point to one of the plurality of conductive vias, the impedance device being disposed adjacent a second major surface of said substrate.

25. The switch arrangement of claim 21 further including a plurality of control lines  
5 arranged in pairs and disposed on said first major surface of said substrate, each control line pair being coupled to an associated one of said plurality of MEMS switches and being disposed between two adjacent strip lines of said plurality of strip lines.

26. An antenna comprising a plurality of end fire Vivaldi antennas arranged in a cloverleaf  
10 configuration in combination with the switch arrangement of claim 15 for controlling which one or ones of said plurality of end fire Vivaldi antennas is or are active.

27. An antenna comprising a plurality of end fire Vivaldi antennas arranged in a cloverleaf  
15 configuration in combination with the switch arrangement of claim 15 for controlling which one of said plurality of end fire Vivaldi antennas is active.

28. A method of making a switch arrangement comprising:  
(a) disposing a plurality of MEMS switches on a substrate in a circular pattern about a point, the circular pattern having a diameter which is less than a half wavelength of frequencies  
20 in a passband of the switch arrangement;  
(b) disposing a plurality of RF lines disposed in a radial pattern relative to said point on said substrate; and  
(c) connecting said plurality of RF strip lines to a common junction point at said point on said substrate via said plurality of MEMS switches whereby operation of a one of said  
25 plurality of MEMS switches couples a one of said plurality of RF strip lines to said common junction.

29. The method of claim 28 wherein at least two of the MEMS switches of said plurality of

MEMS switches are arranged to couple selectively at least two RF lines to said point and wherein a pair of the at least two RF lines are disposed co-linearly of each other.

30. The method of claim 29 wherein at least one of the MEMS switches of said plurality of MEMS switches is arranged to couple selectively the common junction point to another common junction point associated with another switch arrangement made according to the method of claim 28 via a transmission line segment disposed on said substrate.

31. The method of claim 30 further including providing a ground plane in the substrate and providing a conductive via in said substrate arranged parallel to and on an axis through said point and normal to a major surface of said substrate, the conductive via passing through said ground plane without contacting same.

32. The method of claim 31 further including disposing a plurality of strip lines on said surface and coupling each one of said plurality of strip lines to a RF contact of one of said plurality of MEMS switches.

33. The method of claim 32 wherein said plurality of strip line and said plurality of MEMS switches are disposed on the first major surface of said substrate.

34. The method of claim 33 further including disposing a plurality of control lines on the first major surface of said substrate, each control line being coupled to an associated one of said plurality of MEMS switches and being disposed between two adjacent strip lines.

35. The method of claim 34 further including providing a plurality of conductive vias in said substrate arranged parallel to said axis and contacting said ground plane, each of said plurality of MEMS switches having a DC ground contact which is wired to a one of the plurality of conductive vias contacting said ground plane.

36. The method of claim 35 further including coupling an impedance device between (i) the conductive via connected to the common junction point and (ii) at least one of the plurality of conductive vias, the impedance device being disposed adjacent a second major surface of said substrate.

37. The method of claim 33 further including disposing a plurality of control lines arranged in pairs on the first major surface of said substrate, each control line pair being coupled to an associated one of said plurality of MEMS switches and being disposed between two adjacent strip lines.

38. A switch arrangement comprising:

(a) a plurality of MEMS switches arranged on a substrate about a common RF port, the RF port having a centerline and each MEMS switch being disposed spaced equidistantly from the centerline of said RF port by a distance which is less than one quarter wavelength for frequencies in a passband of the switch arrangement; and

(b) connections for connecting a RF contact of each one of said MEMS switches with said common RF port.

39. The switch arrangement of claim 38 wherein the centerline of the RF port is disposed perpendicular to a major surface of said substrate.

40. The switch arrangement of claim 38 wherein the centerline of the RF port is disposed parallel to a major surface of said substrate.